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ABSTRACT

The 44 entries in this annotated bibliography were drawn from reading-related articles appearing from 1970 to 1979 in three science education journals--"Science Teacher," "American Biology Teacher," and "School Science and Math." The entries are arranged according to the following categories: (1) materials selection, (2) techniques for integrating reading and science instruction, (3) diagnosis of reading skills, (4) reading-study skills development, and (5) science reading and the affective domain. (FL)

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TEACHING READING IN SECONDARY SCIENCE CLASSES: AN ANNOTATED BIBLIOGRAPHY

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Introduction

This annotated bibliography on teaching reading in secondary science classes is intended as a resource for university content reading specialists and secondary school reading consultants as well as secondary science teachers and university science methods instructors.

Entries include reading-related articles which appeared in three science education journals during a ten-year period from 1970 through 1979. Selected for review were the three science education journals most highly recommended by science methods instructors on the thirteen four-year campuses of the University of Wisconsin System (Greenewald and Wolf, in press).

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The three journals in order of their ranking are (1) The Science Teacher, (2) American Biology Teacher, and (3) School Science and Math.

These journals were surveyed for articles on the following topics: (1) Materials Selection; (2) Techniques for Integrating Reading and Science Instruction (directed reading lesson plans and methods for individualizing reading assignments); (3) Diagnosis of Reading Skills; (4) Reading-Study Skills Development; and (5) Science Reading and the Affective Domain (enrichment reading activities designed to foster positive attitudes toward science reading).

Articles included in the bibliography are arranged according to the aforementioned classification scheme. When an article deals with more than one subject, it is listed under the topic that is given the most emphasis.

References

Greenewald, M. Jane and Wolf, Anne E. Professional journals in secondary education: which ones do teacher educators recommend most? The Clearing House (in press).

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Material Selection

DeRose, J.V., & Whittle, J.R. Selecting textbooks: A plan that worked. The Science Teacher, 1976, 43(6), 38-40.
Reviews how a school district might go about selecting a textbook, how to involve teachers, supervisors, and administrators in meaningful ways in the selection process, and what to look for in science programs.

Doran, R. Use, don't abuse the media. School Science and Mathematics, 1972, 72, 3-6.
This article suggests that articles from the popular media can be used as a focal point for class discussions in science and teaching strategies which can be used to emphasize the necessity for critically evaluating what we read, hear, and see.

Doran, R.L., & Sheard, D.M. Analyzing science textbooks. School Science and Mathematics, 1974, 74, 31-37.
Analysis of textbooks should include readability, content, presentation of material, mathematical demands, appearance, quality of illustrations, and teacher aids. Subjective considerations are also involved. Provides a textbook analysis rating form.

Hartford, F., & Good, R. Assessment of cognitive requirements of instructional materials. School Science and Mathematics, 1976, 76, 231-237.
This article notes the importance of assessing both the cognitive ability of the students and the cognitive demands of materials and stresses that more attention needs to be paid to the development and use of efficient, effective instruments which assess cognitive requirements of instructional materials.

Kennedy, K. Determining the reading level of biology textbooks. American Biology Teacher, 1979, 41, 301-303.
Explains the 'Fry Readability Graph' and examines the results of applying the 'Fry' on various biology textbooks.

Kennedy, K. Reading level determination for selected texts. The Science Teacher, 1974, 44(3), 26-27.
The textbook is most effective when the author's style and vocabulary result in material with a reading level appropriate for the students who are to use it. Presents 'Fry's Readability Graph' and explains its use.

Leonard, W.H., & Lowery, L.F. A criterion for biology textbook selection. American Biology Teacher, 1976, 38, 477-479.
Suggests that one criterion worthy of consideration in textbook selection for biology classes is the style of questions asked in textual reading.

Lowery, L.F., & Leonard, W.H. Development and method for use of an instrument designed to assess textbook questioning style. School Science and Mathematics, 1978, 78, 393-400.
The questions used in science texts should be examined in terms of types, styles, and possible effectiveness when selecting science textbooks for classroom use. This article suggests a way to measure these aspects in regard to textbook selection.

Readability tests and science texts. (TST Forum) The Science Teacher, 1974, 41(7), 48-49.
This article warns of inaccuracies which may occur when doing a readability test on science material.

Ricker, K.S. But can they read it? A look at readability formulas. The Science Teacher, 1978, 45(3), 22-24.
Teachers frequently turn to one of several formulas to determine readability. Warns that even with objectively obtained reading scores, the teacher must consider numerous other factors which cannot be quantified.

Techniques for Integrating Reading and Science Instruction

Arnold, D.S., Atwood, R.K., & Rogers, V.M. An investigation of relationships among question level, response level, and lapse time. School Science and Mathematics, 1973, 73, 591-594.
The results of this study indicate that teacher questions above the memory level can serve as the mechanism for getting students to function at higher cognitive levels.

Lamb, W. G. Ask a higher-level question, get a higher-level answer. The Science Teacher, 1976, 43(4), 22-23.
Research shows that the typical science teacher uses memory-recall questions almost exclusively even though

newer curricula recognize the importance of stressing higher-level questions. Discusses how to determine the number of higher order questions and problems related to question asking.

Atwood, R.K., & Stevens, J.T. Relationships among question level, response level, and lapse time: Secondary science. School Science and Mathematics, 1976, 76, 249-254.
There is a strong relationship between the teacher's questioning level and the response level of the students.

Barrow, L.H. Close encounters of biology and reading. American Biology Teacher, 1979, 41, 307-308.
This article addresses the problem of what biology teachers can do to improve the reading abilities of their students, especially those who have difficulty reading.

Carter, G.S., & Simpson, R.D. Science and reading: A basic duo. The Science Teacher, 1978, 45(3), 18-21.
Discusses diagnosis of reading ability, how to help students who have difficulty reading, vocabulary development, levels of comprehension, and readability.

Collins, M. Helping students do better on tests. American Biology Teacher, 1979, 41, 239-240.
Provides a technique to show students how they can control the factors which cause them to make errors on tests, improve their study habits, future test performances, and their attitudes.

Cornelius, D.W. A 'once upon a time' approach to reading. The Science Teacher, 1979, 46(2), 37-38.
Suggests the wider use of oral reading in science class for short periods each day to help students deal with higher concept load, vocabulary, syntax, and interpretation.

Cummings, S.L. Testing as a learning tool and involvement stratagem. The Science Teacher, 1972, 39(1), 49-50.
Describes how to construct a testing program which treats testing as a learning tool by involving students in the correction process.

Esler, W.K., & King, M. Jr. Teaching reading through science experience stories. School Science and Mathematics, 1976, 76, 203-206.
Show how manipulative and observational science activities may provide for science experience stories to use in reading and language arts programs with remedial junior high school students.

Gage, T. How can we help kids read science textbooks? The Science Teacher, 1974, 41(9), 37-40.
Offers suggestions on how to help students read their science text - a text which is linguistically different from other texts students are expected to read.

Gardner, K.L. Meeting individual differences through assignment options. American Biology Teacher, 1976, 38, 439;442.
Describes a program designed to meet the needs of individual students. Suggests that students select their own program from a list of options and gives teachers a system for monitoring their work.

Greene, J.G. Broadening the scope of biology education. American Biology Teacher, 1977, 39, 491-494.
Describes cooperation between a biology teacher and teachers of several other disciplines to broaden the scope of biology education. One of the areas of cooperation was between the biology department and the English and reading departments.

Hosker, G.W. A new approach to reading difficulties. The Science Teacher, 1974, 41(6), 42-43.
Learning vocabulary can be fun and reading difficulties in the various science-oriented classes may be alleviated with some of the methods presented here.

Miceli, C. Developing a useful model for teaching vocabulary concepts in science. The Science Teacher, 1975, 42(6), 21.
Describes several ways in which science vocabulary can be presented and learned and explains a study which was done utilizing the techniques discussed.

Perry, C.M. Questions. American Biology Teacher, 1979, 41, 360;362.
Discusses good questioning techniques for classroom teachers to use.

Riley, S.L., & Westmeyer, P.H. Does ISCS improve reading skills? The Science Teacher, 1972, 39(9), 27.
Reading skills of students seemed to improve while using Intermediate Science Curriculum Study (ISCS) materials. Suggests that possibly the ISCS student has a reason to read and make sense of what he has read.

Rydzwski, Sister Mary Marcia. Using the multitext approach. The Science Teacher, 1974, 41(3), 39-40.
With the multitext approach the teacher eliminates a single text for all students from the classroom and replaces it with a variety of texts in a given subject. Discusses the advantages of a multitext approach.

Taylor, A.E. Stability and change of selected student behaviors of slow sections in tenth grade biology classes. School Science and Mathematics, 1972, 72, 228-234.
Discusses strengths and weaknesses of slow students relative to reading skills and points out the need for modified science programs to help these students realize their potential.

Taylor, D.W. 'Student sheets' improve large group instruction. The Science Teacher, 1972, 39(4), 53-54.
Describes a form of study guides to lead students in a logical way through a fairly complicated process.

Telfer, R., & Moore, D. Improving reading in individualized science. The Science Teacher, 1975, 42(6), 22.
Biology and reading courses were combined to improve reading by having students read more material with greater comprehension and to develop a successful, individualized biology program.

Thelen, J.N. Just because kids can't read doesn't mean they can't learn! or every science and mathematics teacher is not a teacher of reading. School Science and Mathematics, 1979, 79, 457-463.
This article describes how to construct graphic organizers.

Van Deuren, A.E. Improving basic skills in the modified science classroom. American Biology Teacher, 1979, 41, 471-474.
Describes some techniques to use to improve reading and writing skills of poor readers in science classrooms.

Wall, J., & Summerlin, L. Choosing the right test. The Science Teacher, 1972, 39(8), 32-36.
This article discusses the importance of high quality testing instruments and their various characteristics.

Warren R.A. Helping poor readers in secondary science. The Science Teacher, 1975, 42(5), 55.
This article describes how to prepare audio materials for poor readers in secondary science.

Wright, J.D., & Hounshell, P.B. Enhance reading through science. The Science Teacher, 1978, 45(8), 34-36.
Discusses many areas of reading and science including material selection, diagnosis of reading skills, and reading skill development as well as instructional planning to meet the needs of all students.

Zorn, F.J. The science-language arts core program... improving reading skills through junior high school science. School Science and Mathematics, 1973, 73, 409-413.
Reviews the development of a program to provide a junior high school curriculum suitable for use with students reading at lowest grade levels.

Diagnosis of Reading Skills

Cornelius, D.W. Individualized testing for content reading. The Science Teacher, 1974, 41(7), 40-41.
'Knowing how to read' and 'reading skills' in a content area are not synonymous. Teachers need to know how to test for content reading skill proficiency as well as for knowledge acquisition and the achievement of behavioral objectives. Describes a group testing procedure.

Reading-Study Skill Development

Annis, L., & Davis, J.K. Study techniques - comparing their effectiveness. American Biology Teacher, 1978, 40, 108-110.
Summarizes four studies on the most effective study techniques for individual students and provides practical suggestions.

Bancheri, L.P. Operation reads. The Science Teacher, 1974, 41(3), 36-37.
Suggests that all teachers teach reading skills necessary for their course at the beginning of the course.

Cooney, T.J., & Henderson, K.B. Structuring knowledge in mathematics and science. School Science and Mathematics, 1972, 72, 425-430.
Discusses activities which teachers can use to help their students to structure their knowledge and develop study skills.

Tigani, G.J. Science students in the library. American Biology Teacher, 1971, 33, 173-174.
One of the first objectives of any science course should be to train students to use the library and identify current trends in specific sciences.

Science Reading and the Affective Domain

Cornett, C.F. Reading for fun...in science class? The Science Teacher, 1975, 42(5), 58-59.
Explains a free reading period devoted to reading

science related books for fun. Includes a list of possible books and magazines with the difficulty level and popularity noted.

Fisher, T.H. The development of an attitude survey for junior high science. School Science and Mathematics, 1973, 73, 647-652.

Describes the development of an experimental rating scale for monitoring attitudes of students toward seventh and eighth grade science. Three questions deal specifically with attitude of students toward reading in science.

Wright J.L. The novel as a device for motivating junior high science students. American Biology Teacher, 1979, 41, 502-504.

Explains how to use Julie of the Wolves by Jean Craighead George to motivate students in science class and help them to develop conceptual understandings of nature and ecology and the relationships of humans to both.